

Cell Phone-based Lateral Flow Assay for Blood Biomarker Detection, Phase II Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)



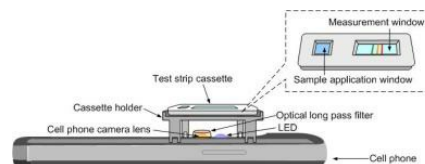
ABSTRACT

The ability to integrate a sensor platform with a cell phone for health monitoring and disease diagnosis for astronauts in space has the potential to be cost effective and space saving. In this proposal, Intelligent Optical Systems (IOS) builds upon its expertise in lateral flow test strip (LFTS) assays by integrating an LFTS with a cell phone for the quantitative measurement of blood-based biomarkers. Our innovative and extremely cost-effective multi-analyte LFTS approach is eminently suited for space travel. Taking advantage of the built-in flash and high resolution camera, in Phase I we have modified a commercially available cell phone with optical filters, lenses, a UV LED excitation source, and a cassette holder for LFTS image capture. In Phase II, we will expand the capability of cell phone-based LFTS for an antibody-antigen sandwich binding assay to include blood gas measurements by developing sensitive indicator films to be integrated with our cell phone-based detector. Furthermore, we will develop cell phone-based software for on-cell phone detection and data processing with an expanded panel of biomarkers, advancing the TRL from 5 to 7.

ANTICIPATED BENEFITS

To NASA funded missions:

Potential NASA Commercial Applications: Future space missions will require prolonged stays of crew members onboard space stations, and on other spacecraft for journeys to other planets. Increasingly complex space missions will also require monitoring the health status of astronauts, preferably in a point-of-care apparatus that is compact and simple. The IOS system will enable NASA to monitor the health status of crew members by means of simple blood-based biomarker detection. A lateral flow test strip will be integrated with a cell phone into a simple and compact blood biomarker detection platform. This platform will gather diagnostic information in the absence of medically trained personnel, and can also monitor the health of aircraft

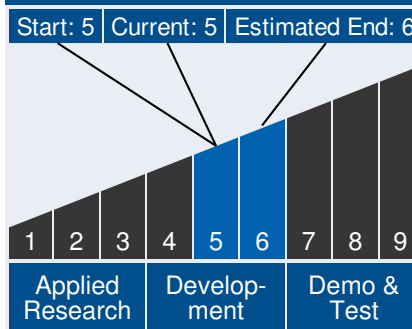


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Technology Maturity



Management Team

Program Executives:

- Joseph Grant
- Laguduva Kubendran

Program Manager:

- Carlos Torrez

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pilots, cabin crews, passengers, and others in aeronautics-related occupations.

To the commercial space industry:

Potential Non-NASA Commercial Applications: A cell phone-based serum biomarker detection platform will be cost-effective and compact not only for space exploration; it will also benefit the overall healthcare industry. Cell phones are becoming increasingly prevalent all over the world, with approximately five billion subscribers worldwide, and in the U.S. approximately one in three adults owns a smart phone. The ability to integrate a simple LFTS assay with a cell phone will enable healthcare providers to perform blood tests for many diseases on a wide population, including populations in remote areas where healthcare facilities are sparse. Such a platform can have a major impact in developing countries where a simple cell phone can be converted into a blood marker detection platform, avoiding the cost of acquiring dedicated medical equipment; furthermore, this point-of-care device improves the probability of early detection, yielding additional savings in overall healthcare cost. Military field medicine will also benefit from the availability of a versatile handheld medical blood testing device that takes advantage of the ubiquitous mobile phone to minimize weight and power requirements.

Management Team (*cont.*)

Project Manager:

- Tianna Shaw

Principal Investigator:

- Henry Lin

Technology Areas

Primary Technology Area:

Human Health, Life Support, and Habitation Systems (TA 6)

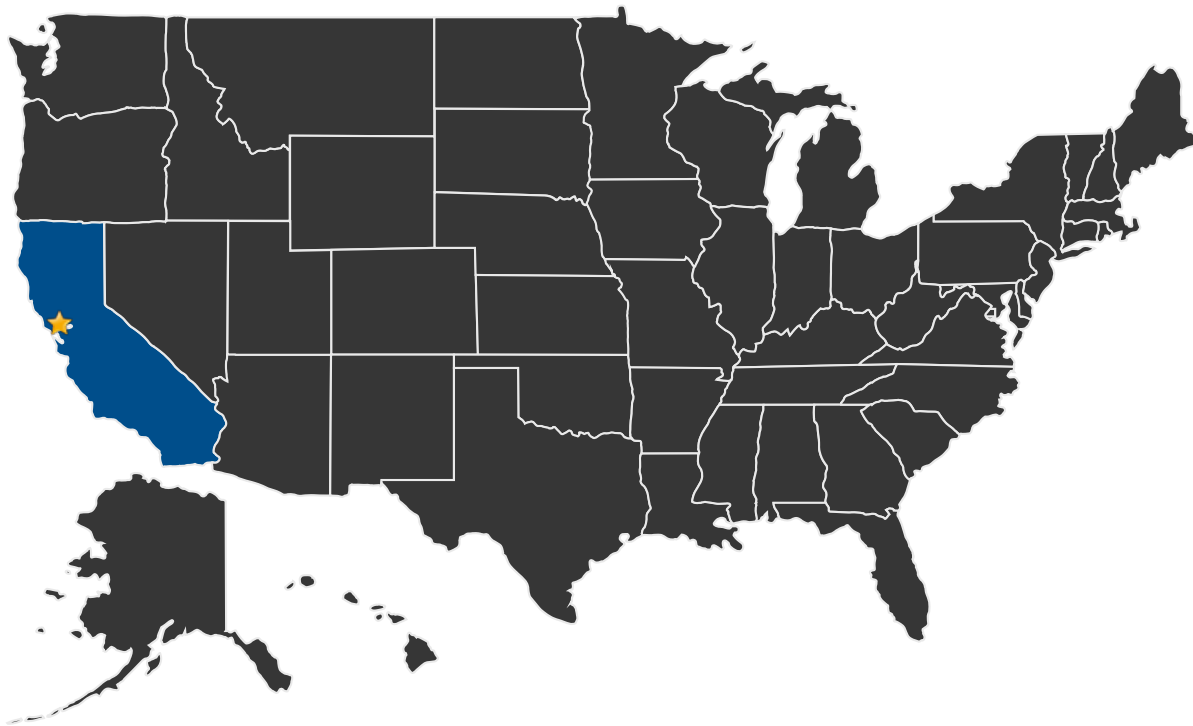
- └ Human Health and Performance (TA 6.3)
 - └ Medical Diagnosis and Prognosis (TA 6.3.1)

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U.S. WORK LOCATIONS AND KEY PARTNERS



■ U.S. States With Work ★ **Lead Center:**
Ames Research Center

Other Organizations Performing Work:

- Intelligent Optical Systems, Inc. (Torrance, CA)

PROJECT LIBRARY

Presentations

- Briefing Chart
 - (<http://techport.nasa.gov:80/file/20187>)

Active Project (2013 - 2016)

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DETAILS FOR TECHNOLOGY 1

Technology Title

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